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Abstract

SLOW NEUTRON SCATTERING BY THE BONDED HYDROGEN

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This paper is mainly based on the Van Hove's original work on the introduction of space time correlation functions. Inelastic scattering of slow neutron is considered on hydrogenous substances since the prevalence of neutron incoherent scattering by hydrogen considerably simplifies the interpretation of the theoretical and experimental results. This choice is caused as well by the importance of hydrogenous substances for the reactor engineering.

The state of the general theory of scattering function on the contemporary stage of the thermalization theories considered and the perspective of using the different approximation of scattering function is discussed in this paper. Considered is the relation between the Van Hove's space time correlation functions and the temperature-dependent Green's functions which is the powerful apparatus for solving the number of problems on the statistical physics.

Since the spherical harmonic method is most commonly used calculation method of the space energy distribution of neutrons in a reactor the angular moments of differential cross section of the slow neutron scattering are calculated in this paper.

The calculations are mainly carried out for water and zirconium hydride on electronic digital computers "Minsk-2".

To compare their efficiency various approximations models of differential cross sections of slow neutron scattering are used for calculations.

The calculation data obtained are compared with the available experimental data. The calculation results on $\sigma(E)$, $\{\sigma(E)\}$, $\mu(E)$ are given in diagrams and tables.